T1: AI-assisted Scientific Discovery, Experimentation, Content Generation, and Evaluation

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`https://ai4science-tutorial.github.io/`
Cutting-edge
Pavillon DE RABAT (Level 1)
Saturday, March 28, 2026 - from 09:00 to 12:30

With the advent of large multimodal foundation models such as ChatGPT, Gemini, Claude, and DeepSeek, scientific research stands at the threshold of an AI-based technological transformation. Recent surveys indicate that the majority of researchers anticipate AI will become mainstream in scientific research within the next two years. This tutorial provides an in-depth overview of recent advances in AI-assisted tools and models that support and enhance the entire scientific research process, building upon findings from our recent survey paper. We will explore how AI is revolutionizing each stage of the research cycle: (1) Literature Search and Summarization – examining AI-enhanced search systems, paper chat interfaces, graph-based knowledge discovery, and personalized recommender systems; (2) Idea Generation and Experimentation – covering LLM-based hypothesis formulation, multi-agent systems, and automated experimentation tools; (3) Multimodal Content Understanding and Generation – surveying approaches to scientific figure comprehension, automatic diagram generation from text, and poster/slide creation; (4) Text-based Content and Table Generation – reviewing models for abstracts, citations, meta-analysis tables, and long-form content like survey papers; and (5) AI-supported Peer Review – introducing automated review analysis, feedback generation, and meta-review synthesis.

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Bio. Yufang Hou is a professor at IT:U – Interdisciplinary Transformation University Austria. At IT:U, she leads the NLP group with a strong focus on LLMs governance (with a particular focus on content veracity), computational argumentation, fact-checking, knowledge representation and reasoning, and human-centred NLP applications in education, science, and health. Yufang has served as an organizing committee member and senior program committee member for various NLP conferences, and has co-organized several workshops on topics such as argument mining, efficient NLP, and AI4Science.

Steffen Eger, University of Technology Nuremberg, Germany
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Bio. Steffen Eger is a Full Professor at University of Technology Nuremberg, Germany, leading the Natural Language Learning & Generation. His research focuses on various aspects of Natural Language Processing (NLP), in particular evaluation for text generation and interdisciplinary problems at the intersection of NLP, the digital humanities and the social sciences. Recently, he has developed a keen interest in multimodal scientific content generation in the science domain. He has served the ACL community in various roles (SAC, AC, reviewer) and has extensive experience organizing ACL workshops in the context of evaluation and AI4Science.

Anne Lauscher, University of Hamburg, Germany
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Bio. Anne Lauscher is a Professor of Data Science at the University of Hamburg, where her research group investigates safe and responsible Natural Language Processing. Beyond her strong focus on ethical aspects of AI, she also developed an interest in mining scientific literature and citation analysis already during her Ph.D. studies. Further focusing on AI4Science, she recently presented works on analyzing peer reviews and supporting peer reviewers with targeted AI systems as well as on supporting physics experimentation through deploying LLMs in agentic setups. In the past, Anne has co-organized multiple workshops and served the ACL community in various roles, e.g., as senior area chair and as ethics reviewer.

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Bio. Wei Zhao is a Lecturer (=Assistant Professor) in NLP at the University of Aberdeen, Scotland. His research group works on evaluation of NLP systems, cross-temporal NLP, and more recently, AI for Science. He has served as an area chair and reviewer in the ACL community. He has also co-organized several NLP workshops in the ACL and COLM communities on the topics of evaluation of NLP systems and cross-temporal NLP, as well as AI4Science, the 1st Workshop on Human–LLM Collaboration for Ethical and Responsible Science Production, together with three other tutorial presenters.

Yong Cao, University of Tübingen, Germany
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Bio. Yong Cao is a postdoctoral researcher at the University of Tübingen, Germany. His research focuses on AI4Science, including multimodal document understanding, summarization, scientific impact prediction, and scientific document generation. Additionally, he also organizes workshops at ACL conferences and leads AI4Science Seminar events at the University of Tübingen. Yong's academic contributions have been featured in prestigious NLP conferences such as ACL, NAACL, EACL, ICLR, CoLM and NeurIPS including reviewer and area chair. He also serves on the program committee at AAAI 2022-2025.